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Terminal Boxes Series SM2

Catalogue N°:

15SM2CATR01-E

Revision:

01 of 18.03.2002



Specification N° **SPR/**

15SM2GENR00-E

Accessory:

Terminal Boxes Series SM2

Page N°:

1 of 3

Title:

Function, general features and range of types

Revision:

00 – 23/09/01

1.0 Function, features, range of types, assembly and operation

This specification concerns the function, the main features, the range of types and the assembly and operation of the terminal boxes Series SM2. Environmental and operating conditions depend generally from the compatibility of the materials and components and from the surface finish.

2.0 Function

The measurement, control, check and data recording circuits for medium and high power, oil-cooled, oil-insulated electric transformers require medium and low voltage and current signals to be brought outside the tank.

The terminal boxes Series SM2 are designed and constructed to meet these requirements since they offer oil-tight, insulated through conductors protected with a flanged casing and accessible through cable entries.

3.0 Construction features

The terminal boxes Series SM2 consist mainly of a flanged casing, closed by a cover, inside which are mounted the terminals. One end of the terminal is wired inside the transformer tank while the other end is wired outside the tank through threaded cable entries.

The following data apply only to the terminal boxes Series SM2 fitted with M6 terminals.

3.1.0 General features

- Flanged casing with lowered bottom to prevent air pockets; the casing has one or more cable entries and is closed by a cover; protection degree of the box is IP 65; identification labels inside and outside the box allow identification of terminal box as well as of terminals;
- The cable entries are threaded to customer request and supplied on request either plugged by brass plugs or with brass cable glands with gasket;
- Terminal boxes are supplied with the number of terminals requested by customer;
- The standard terminals are one-piece conductors threaded M6 at both ends for connection of a \varnothing 6 mm cable terminal; oil-tightness is obtained by O-Ring gasket;
- The terminals are designed and mounted so that they cannot twist when the cable terminal is screwed on and have a Snap-On ring to prevent accidental loosening during transport, handling and mounting; they are evenly spaced so that they can be connected by connecting plates supplied on request;
- The terminals are supplied with copper washers; inside the tank self-locking nuts are used to assure secure, vibration-proof wiring while the connection inside the terminal box is assured with nut and counter-nut;
- Terminals are numbered on both sides to ease cabling and allow identification;
- Special M10 terminals are also available.

3.2.0 Materials and finish

- Casing and cover of aluminium casting, painted with one coat of epoxy primer and one finishing coat of polyurethane paint, colour RAL 7031; the epoxy primer is compatible with mineral transformer oil at a temperature of up to 120°C, the paint passes the 500 hour salt fog test;
- Nylon insulated nickel plated brass terminals with copper washers and vibration-proof nuts;
- Terminal gaskets of fluor silicone rubber;
- External screws and washers of stainless steel;



Specification N° **SPR/**

15SM2GENR00-E

Accessory:

Terminal Boxes Series SM2

Page N°:

2 of 3

Title:

Function, general features and range of types

Revision:

00 – 23/09/01

- Cable entries are closed by plastic plug during shipment.

3.3.0 Operating conditions

Materials, components and design allow the terminal boxes Series SM2 to be used in the following conditions:

- Environmental temperature with standard gaskets - 20°C to + 50°C
- Relative humidity 95% at 20°C; 80% at 40°C; 50% at 50°C
- Protection degree of box IP 65
- Operating temperature (mineral oil) -20°C to +110°C
- Insulation to earth of terminal at 20°C > 5.000 V
- Standard M6 terminal cross section 12 mm²

Special executions can be supplied for other environmental conditions

3.4.0 Test

Following tests and controls are performed on boxes before despatch:

- Insulation test of terminals towards box; test voltage 3.000V;
- Tightness test of mounted terminals by compressed air and immersion in water bath; test pressure 1 bar;
- Control of correct numbering of terminals

4.0 Range of types

The terminal boxes Series SM2 are produced in 4 types as follows:

- **Type SM2-X**
 - ◇ Dimensions to drawing N° 15.112.00
 - ◇ Number of terminals from 2 to 6
 - ◇ Number and dimensions of cable entries 1 to 2 - max 3/4" or PG 21 or Ø 35 mm
- **Type SM2-S**
 - ◇ Dimensions to drawing N° 15.102.00
 - ◇ Number of terminals from 2 to 12
 - ◇ Number and dimensions of cable entries 1 to 3 - max 1" or PG 29 or Ø 40 mm
- **Type SM2-L**
 - ◇ Dimensions to drawing N° 15.136.00
 - ◇ Number of terminals from 2 to 36
 - ◇ Number and dimensions of cable entries 1 to 3 - max 1" or PG 29 or Ø 40 mm
- **Type SM2-XL**
 - ◇ Dimensions to drawing N° 15.236.00
 - ◇ Number of terminals from 2 to 47
 - ◇ Number and dimensions of cable entries 1 to 4 - max 1 1/2" or PG 42 or Ø 50 mm

Drawings showing the construction of the terminals:

- **Terminal M6** N° 15.102.001
- **Terminal M10** N° 15.102.002



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Specification N° **SPR/**

15SM2GENR00-E

Accessory:

Terminal Boxes Series SM2

Page N°:

3 of 3

Title:

Function, general features and range of types

Revision:

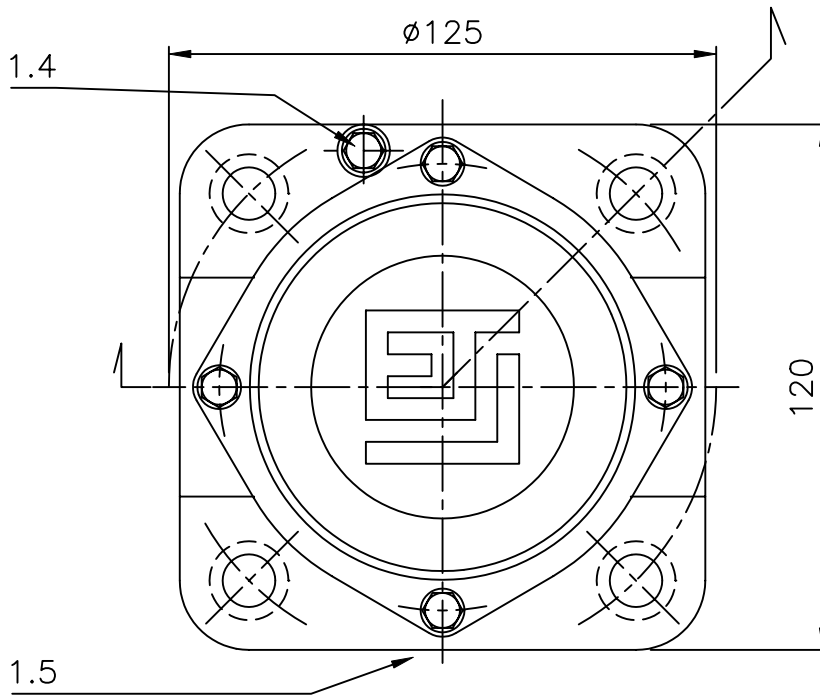
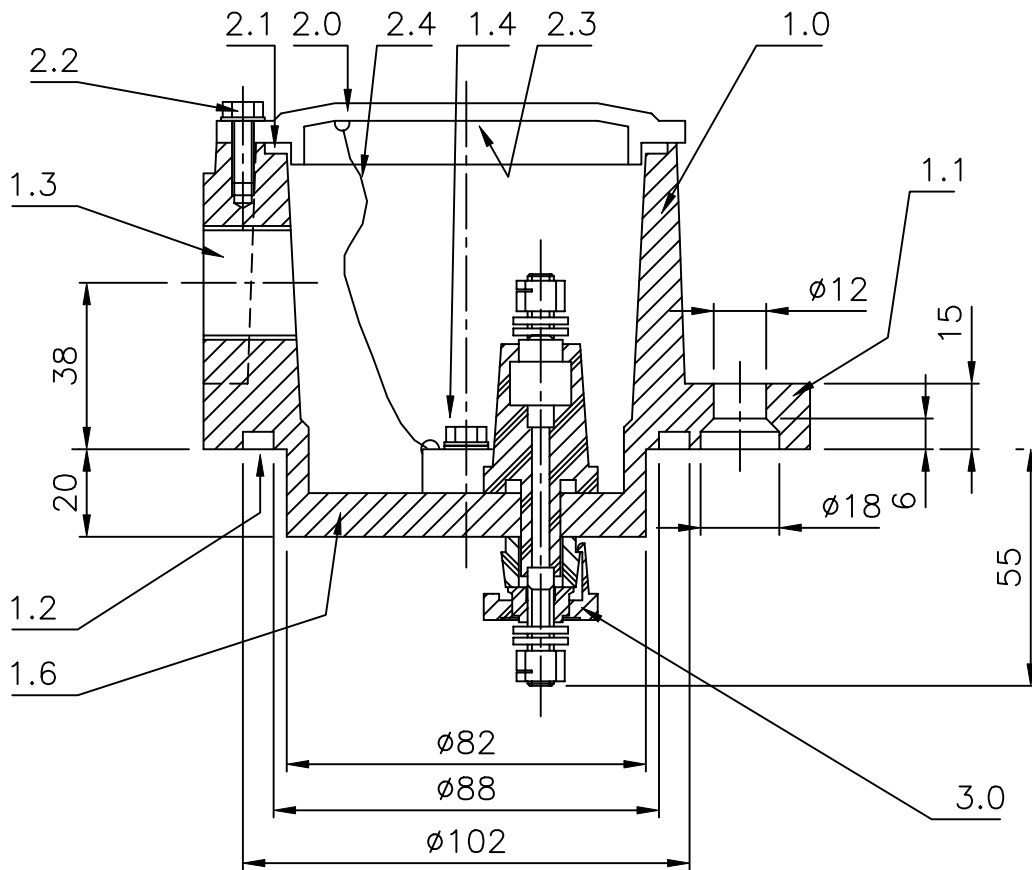
00 – 23/09/01

5.0 Assembly and operation

It is advisable to prepare a wiring plan for each terminal box before assembling, showing the identification of the terminal box, which can be engraved on the terminal box identification plate, and the correspondence between the wire identification and the number of the terminal.

Terminal boxes Series SM2 are then mounted on the transformer tank as follows:

- the wires inside the tank are first connected to the terminals on the bottom of the terminal box in accordance with the wiring plan; for easy wiring and record it is advised to write the wire identification number on the identification plate inside the terminal box cover in correspondence to the number identifying the terminal;
- the terminal box is then bolted to the tank; the flange O-Ring gasket assures oil-tightness;
- the external wires are then led inside the terminal box through the cable entries, there to be connected to the external part of the terminals; each wire has to be connected to the terminal following the numbering previously set up;
- if necessary one or more terminals can be connected by conducting plates that can be supplied separately;
- when the wiring is finished close the cover of the terminal box.



Rif.	Quantità	Titolo/Nome, designazione, materiale, dimensione, etc.			N. articolo/Riferimento	
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Progettato da	Controllato da	Approvato da - data	Nome file	Data	Scala
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ETI Elettindustria S.r.l.
20032 CORMANO ITALY

Titolo/Nome SCATOLA MORSETTIERA
 TERMINAL BOX
 BOITE A BORNES
 Tipo-Type SM2-X //

Numero disegno 15.112.00
 Modifica Foglio



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Nomenclature N°:

15SM2-X-E

Reference drawing N°:

15.112.00

Page N°

1 of 1

Product:

Terminal Box SM2-X

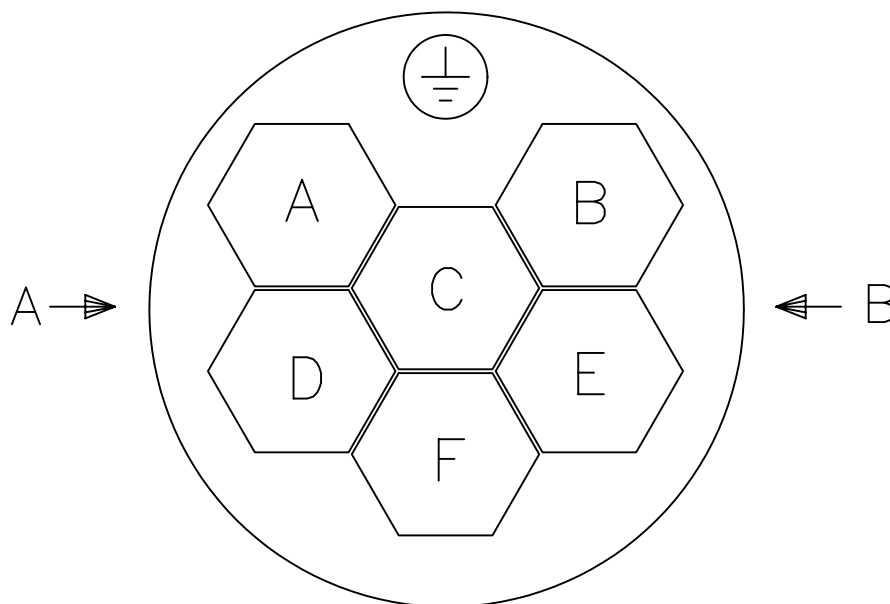
Revision N°

00 of 31.03.2000

Pos.	Part denomination	N°	Material
1.0	Terminal box casting	1	Aluminium
1.1	Mounting flange		
1.2	Gasket seat Gasket OR 6362 – Ø 91,44 X 5,34 mm - supplied with box	1	Nitrile rubber
1.3	Cable entry	1-2	Maximum dimension: 1"G – PG29 – Ø 40mm
1.4	Earth screws - internal and external	2	Stainless steel
1.5	Terminal box identification label	1	Aluminium
2.0	Terminal box cover	1	Aluminium
2.1	Cover gasket OR 4337 - Ø 85,32 x 3,53 mm	1	Nitrile rubber
2.2	Cover assembly screws	4	Stainless steel
2.3	Terminals identification label	1	Aluminium
2.4	Cover holding string	1	Nylon
3.0	Terminal	2-5	See dwg N° 15.101.001

		A	B	C	D	E	F
MORSETTI BORNES TERMINALS	2					1	2
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	4			1	2	3	4
	5	1	2		3	4	5
	6	1	2	3	4	5	6

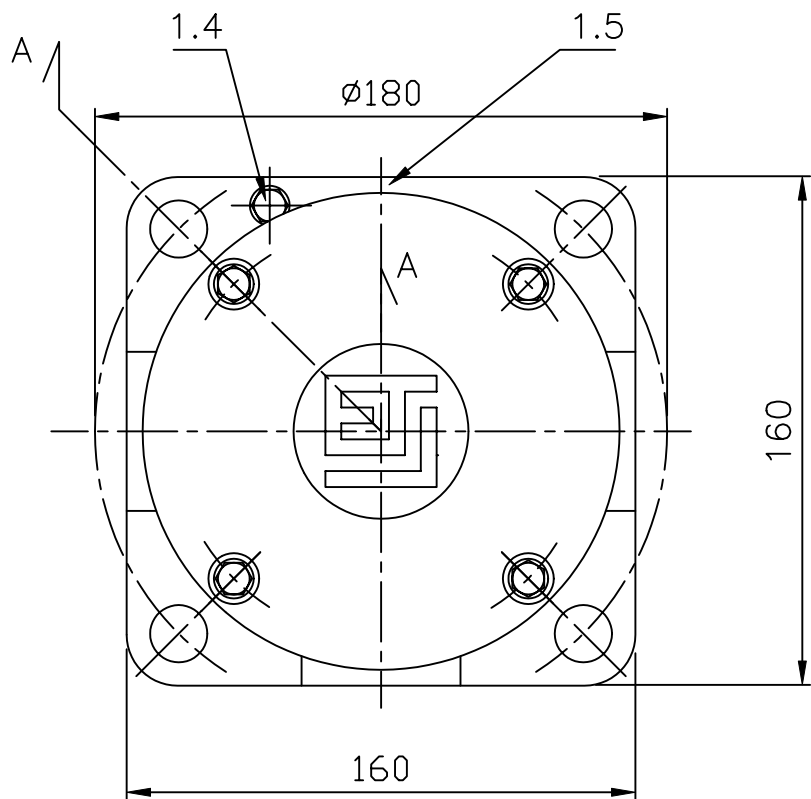
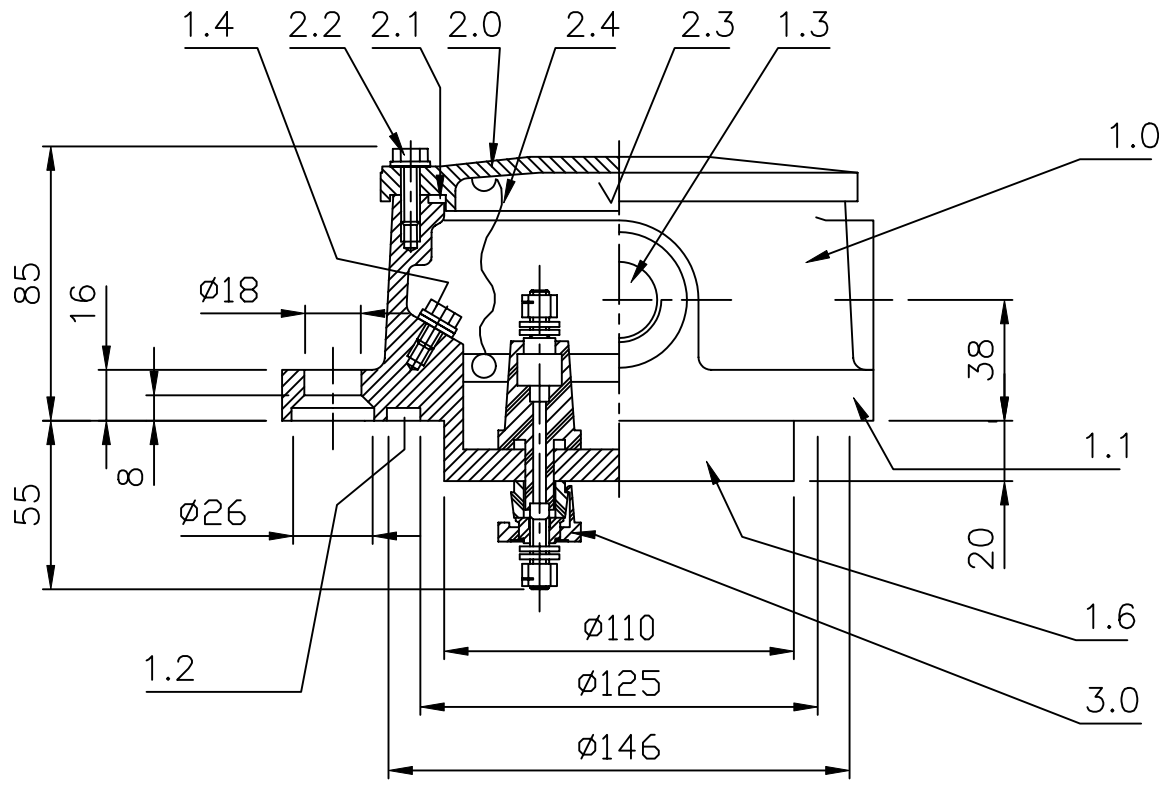
		A	B
USCITE PASSAGES ENTRIES	1		X
	2	X	X



Schema foratura e numerazione
morsetti e boccchettoni
Schema percage et numeration
bornes et passage pour presse-étoupe
Disposition and numbering of
terminals and cable entries

Foratura a 4 morsetti era B-D-E-F 06/02/02

Pos.	Quantità	Descrizione	Materiale	N. articolo
Progettato da		Controllato da	Approvato da - data	Nome file
				Data
				Scala //
ELETTRINDUSTRIA SRL 20032 CORMANO ITALY		Titolo/Nome		TIPO-TYPE
		SCATOLA MORSETTIERA BOITE A BORNES TERMINAL BOX		SM2-X
		Numero disegno	Modifica	Foglio
		15.112.002	A	



Rif.	Quantità	Titolo/Nome, designazione, materiale, dimensione, etc.			N. articolo/Riferimento	
Progettato da	Controllato da	Approvato da - data	Nome file	Data	Scala	
				01-01-98	//	

ETI Elettindustria S.r.l.
20032 CORMANO ITALY

Titolo/Nome
SCATOLE MORSETTIERA - TERMINAL BOX - BOITE A BORNES
 Serie: SM2-S

Numero disegno
15.102.00

Modifica
 Foglio



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Nomenclature N°

15SM2-S-E

Reference drawing N°

15.102.00

Page N°

1 of 1

Product:

Terminal Box SM2-S

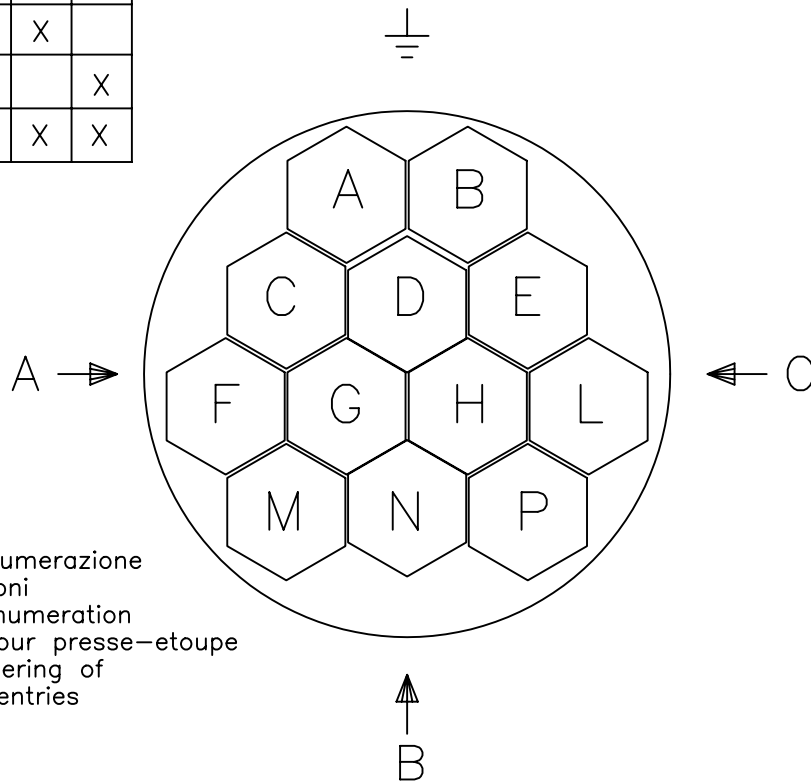
Revision N°

00 of 07/03/99

Pos.	Part denomination	N°	Material
1.0	Terminal box casting	1	Aluminium
1.1	Mounting flange		
1.2	Gasket seat Gasket OR 8500 – Ø 126,4 x 6,99 mm - supplied with box	1	Nitrile rubber
1.3	Cable entry	1-3	Maximum dimension: 1"G – PG29 – Ø 40mm
1.4	Earth screws - internal and external	2	Stainless steel
1.5	Terminal box identification label	1	Aluminium
1.6	Terminal box raised bottom		
2.0	Terminal box cover	1	Aluminium
2.1	Cover gasket OR 4425 - Ø 107,5 x 3,53 mm	1	Nitrile rubber
2.2	Cover assembly screws	4	Stainless steel
2.3	Terminals identification label	1	Aluminium
2.4	Cover holding string	1	Nylon
3.0	Terminal	2-12	See dwg N° 15.102.001

	A	B	C	D	E	F	G	H	L	M	N	P	
MORSETTI - BORNES - TERMINALS	2						1	2					
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	A	B	C
USCITE PASSAGES ENTRIES	1	X	
	2	X	X
	3	X	X



Schema foratura e numerazione morsetti e boccchettoni
 Schema percage et numeration bornes et passage pour presse-etoipe
 Disposition and numbering of terminals and cable entries

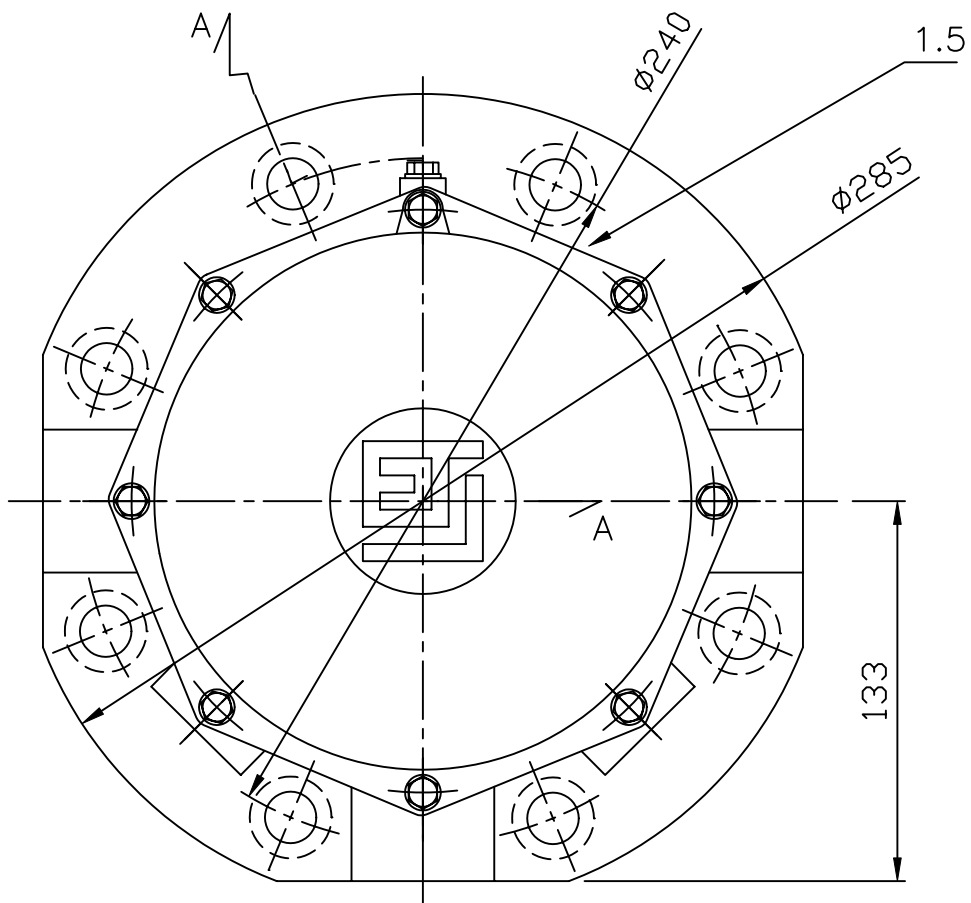
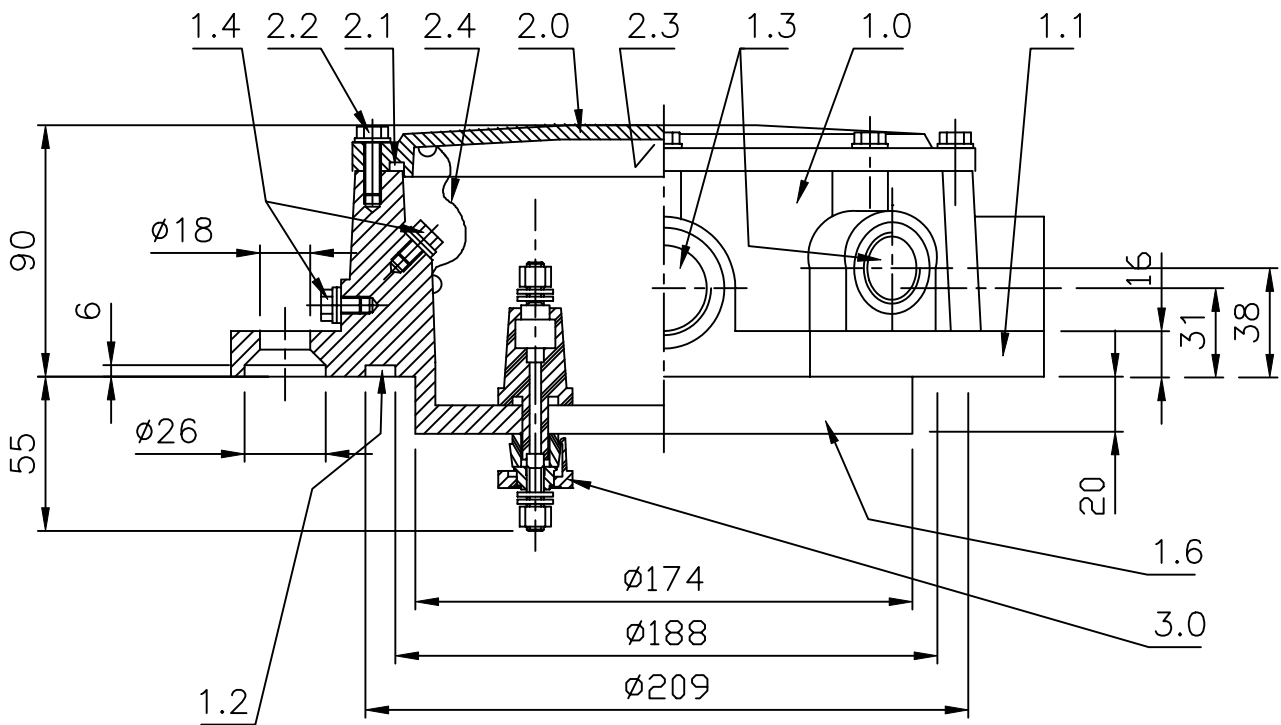
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Progettato da	Controllato da	Approvato da - data	Data 22.01.2002	Scala //



ELETTRINDUSTRIA SRL
 20032 CORMANO ITALY

Titolo/Nome SCATOLA MORSETTIERA BOITE A BORNES TERMINAL BOX	TIPO-TYPE SM2-S	Numero disegno 15.102.002	Modifica	Foglio
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N.rev	Nota sulla revisione	Data	Firma	Controllo
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Rif.	Quantità	Titolo/Nome, designazione, materiale, dimensione, etc.			N. articolo/Riferimento	
Progettato da	Controllato da	Approvato da - data	Nome file	Data	Scala	
				01-01-98	//	



Titolo/Nome
SCATOLA MORSETTIERA - TERMINAL BOX - BOITE A BORNES
Serie: SM2-L

Numero disegno	15.136.00	Modifica	Foglio
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Riproduzione vietata	Non misurare le dimensioni dal disegno
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Nomenclature N°

15SM2-L-E

Reference drawing N°

15.136.00

Page N°

1 of 1

Product:

Terminal Box SM2-L

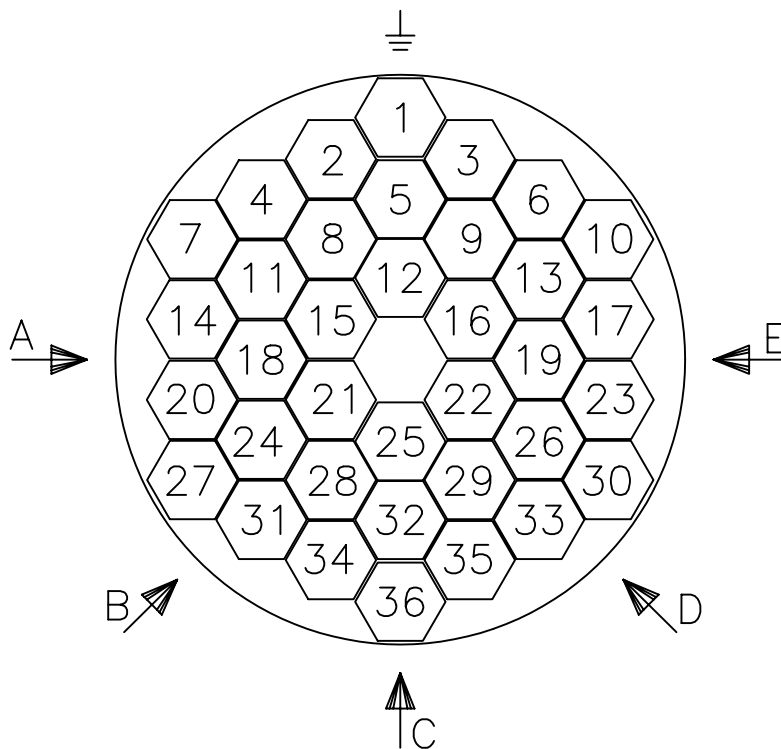
Revision N°

00 of 07/03/99

Pos.	Part denomination	N°	Material
1.0	Terminal box casting	1	Aluminium
1.1	Mounting flange		
1.2	Gasket seat Gasket OR 8750 – Ø 189,9 x 6,99 mm - supplied with box	1	Nitrile rubber
1.3	Cable entry	1-5	Maximum dimension: N° 3 1"G – PG29 – Ø 40mm N° 2 3/4"G-PG21-Ø 30 mm
1.4	Earth screws - internal and external	2	Stainless steel
1.5	Terminal box identification label	1	Aluminium
1.6	Terminal box raised bottom		
2.0	Terminal box cover	1	Aluminium
2.1	Cover gasket OR 4725 - Ø 183,7 x 3,53 mm	1	Nitrile rubber
2.2	Cover assembly screws	8	Stainless steel
2.3	Terminals identification label	1	Aluminium
2.4	Cover holding string	1	Nylon
3.0	Terminal	2-36	See dwg N° 15.102.001

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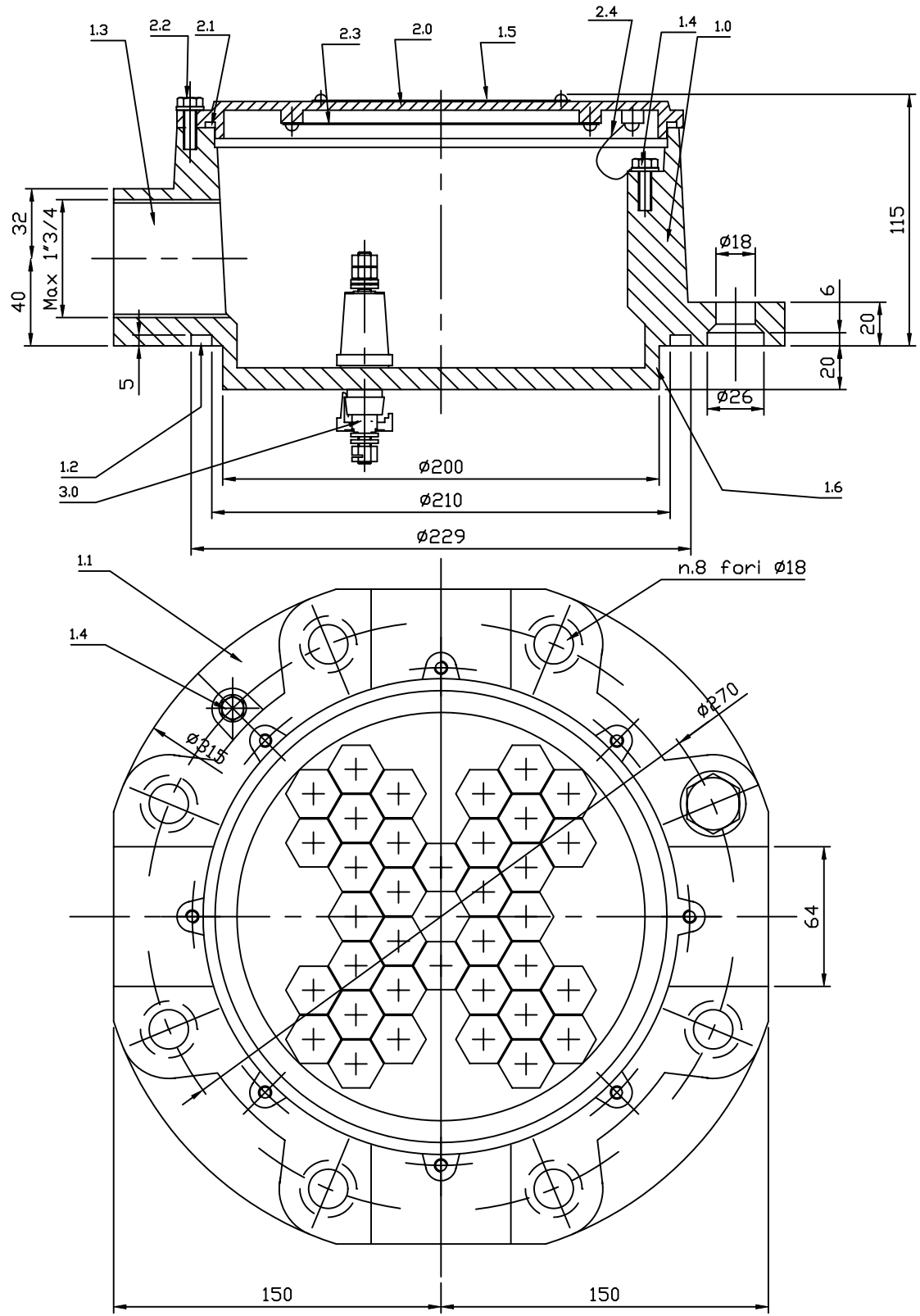
USCITE PASSAGES ENTRIES		A	B	C	D	E
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	3	X		X		X
	4	X	X		X	X
	5	X	X	X	X	X



Schema foratura e numerazione morsetti e bocchettoni
 Schema percage et numeration bornes et passages pour presse-étoupe
 Disposition and numbering of terminals and cable entries


Pos.	Quantità	Descrizione	Materiale	N. articolo
Progettato da		Controllato da	Approvato da - data	Nome file
				Data 22.01.2002
				Scala //
ELETTRINDUSTRIA SRL 20032 CORMANO ITALY		Titolo/Nome SCATOLA MORSETTIERA BOITE A BORNES TERMINAL BOX		
		TIPO - TYPE SM2-L		
		Numero disegno	Modifica	Foglio
		15.136.002		

N.rev	Nota sulla revisione	Data	Firma	Controllo
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Rif.	Quantità	Titolo/Nome, designazione, materiale, dimensione, etc.			N. articolo/Riferimento	
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Progettato da	Controllato da	Approvato da - data	Nome file	Data	Scala
				30/05/2000	///

 ETI ELETTRINDUSTRIA S.r.l. 20032 CORMANO ITALY	Titolo/Nome SCATOLA MORSETTIERA - TERMINAL BOX - BOITE A BORNES Serie : SM2-XL		Modifica	Foglio
	Numero disegno 15.236.00			

Riproduzione vietata Non misurare le dimensioni dal disegno



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Nomenclature N°

15SM2-XL-E

Reference drawing N°

15.236.00

Page N°

1 of 1

Product:

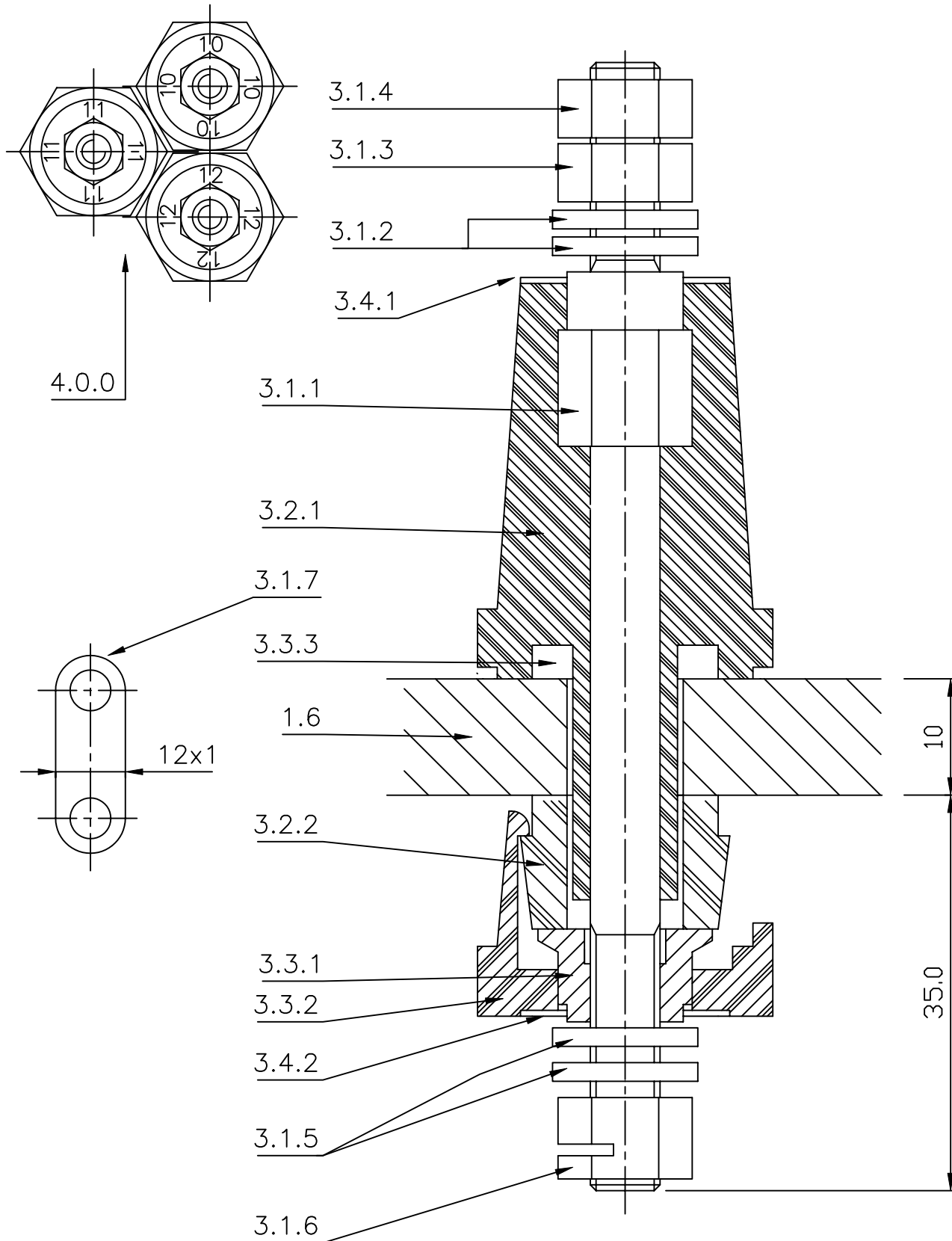
Terminal Box SM2-XL

Revision N°

00 of 21.10.01

Pos.	Part denomination	N°	Material
1.0	Terminal box casting	1	Aluminium
1.1	Mounting flange		
1.2	Gasket seat Gasket OR 8850 – Ø 215,30 x 6,99 mm - supplied with box	1	Nitrile rubber
1.3	Cable entry	1-4	Maximum dimension: 1"3/4G-PG42-Ø 50 mm
1.4	Earth screws - internal and external	2	Stainless steel
1.5	Terminal box identification label	1	Aluminium
1.6	Terminal box raised bottom		
2.0	Terminal box cover	1	Aluminium
2.1	Cover gasket OR 4825 - Ø 209,1 x 3,53 mm	1	Nitrile rubber
2.2	Cover assembly screws	8	Stainless steel
2.3	Terminals identification label	1	Aluminium
2.4	Cover holding string	1	Nylon
3.0	Terminal	2-47	See dwg N° 15.102.001

N.rev	Nota sulla revisione	Data	Firma	Controllo
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Rif.	Quantità	Titolo/Nome, designazione, materiale, dimensione, etc.	N. articolo/Riferimento		
Progettato da	Controllato da	Approvato da - data	Nome file	Data	Scala 2:1



Titolo/Nome MORSETTO - TERMINAL - BORNE
for box Series SM2

Numero disegno 15.102.001	Modifica A	Foglio
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Nomenclature N°

15SM2MORS-E

Reference drawing N°

15.102.001

Page N°

1 of 1

Product:

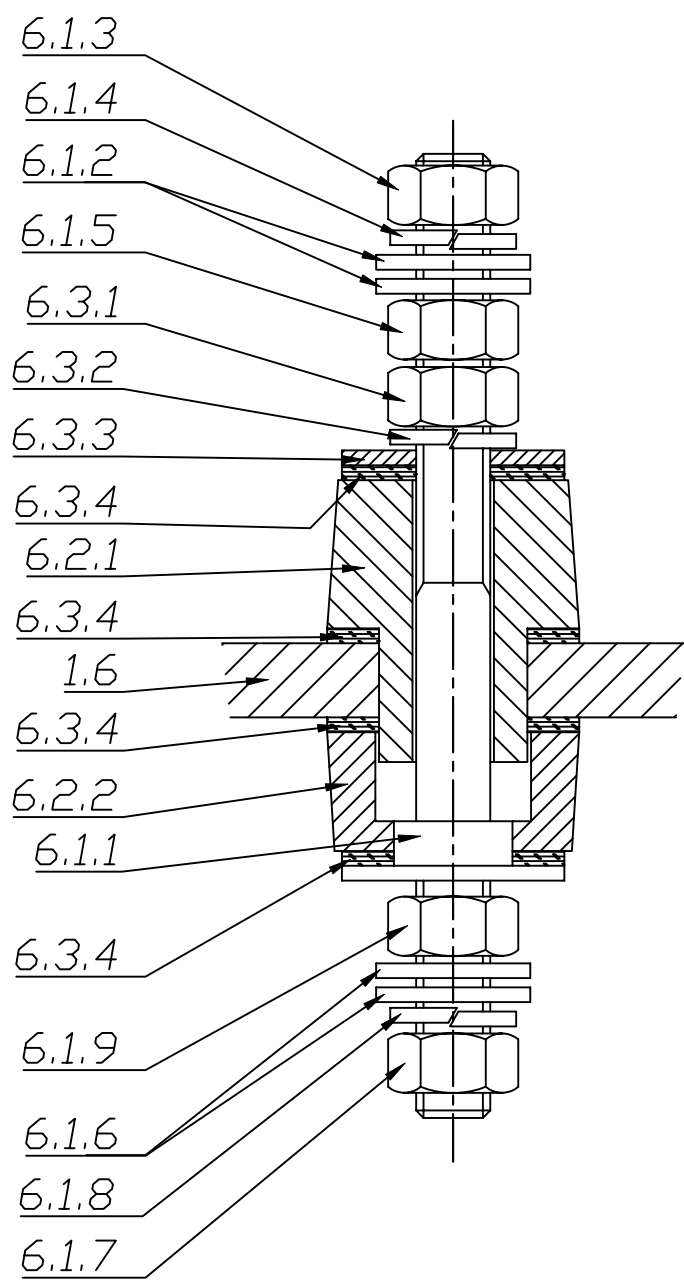
Terminal M6 for terminal boxes Series SM2

Revision N°:

01 of 25.03.99

Pos.	Part denomination	N°	Material
1.6	Bottom of terminal box		Aluminium
3.0.0	Assembly of isolated, oil tight terminal		
3.1.0	Current leading parts		
3.1.1	Terminal	1	Brass
3.1.2	Contact washer of external wire terminal	2	Brass
3.1.3	External wire terminal locking nut	1	Brass
3.1.4	Lock nut	1	Brass
3.1.5	Contact washer of internal wire terminal	2	Brass
3.1.6	Internal wire terminal self-locking nut	1	Steel
3.1.7	Terminals connection plate (if requested)	X	Brass
3.2.0	Insulating parts		
3.2.1	Terminal insulation, moulded on terminal	1	Nylon + glass fiber 30%
3.2.2	Lower spacer	1	Nylon + glass fiber 30%
3.3.0	Oil tightness parts		
3.3.1	Terminal locking nut	1	Brass
3.3.2	Safety against accidental unlocking of nut 3.3.1	1	Nylon + glass fiber 30%
3.3.3	Gasket - OR 4036 - Ø 9,12 x 3,53 mm	1	Fluorosilicone rubber
3.4.0	Identification parts		
3.4.1	Numbered external identification label - glued	1	Nylon
3.4.2	Numbered internal identification label - glued	1	Nylon
4.0.0	Terminal mounting system; avoids unscrewing of terminal while tightening the wire terminals		

N.rev	Nota sulla revisione	Data	Firma	Controllo
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Rif.	Quantità	Titolo/Nome, designazione, materiale, dimensione, etc.			N. articolo/Riferimento	
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Progettato da	Controllato da	Approvato da - data	Nome file	Data 27/02/2001	Scala 1:1
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 ETI ELETTRINDUSTRIA S.r.l. 20032 CORMANO ITALY	Titolo/Nome <i>Scatola morsettiera - Terminal box - Boite a borne</i> <i>SERIE : SM2</i> <i>Morsetto M10 - Terminal M10 - Borne M10</i>		
	Numero disegno 15.102.002	Modifica	Foglio

Riproduzione vietata	Non misurare le dimensioni dal disegno
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Nomenclature N°

15SM2MORSM10-E

Reference drawing N°

15.102.002

Page N°

1 of 1

Product:

Terminal M10 for terminal boxes Series SM2

Revision N°:

00 of 22.10.01

Pos.	Part denomination	N°	Material
1.6	Bottom of terminal box		Aluminium
6.0.0	Assembly of isolated, oil tight M10 terminal		
6.1.0	Current leading parts		
6.1.1	Terminal	1	Brass
6.1.2	Contact washer of external wire terminal	2	Brass
6.1.3	External wire terminal locking nut	1	Brass
6.1.4	Split washer	1	Stainless steel
6.1.5	Counter-nut to fasten external wire terminal	1	Brass
6.1.6	Contact washer of internal wire terminal	2	Brass
6.1.7	Internal wire terminal locking nut	1	Brass
6.1.8	Split washer	1	Stainless steel
6.1.9	Counter-nut to fasten internal wire terminal	1	Brass
6.2.0	Insulating parts		
6.2.1	Terminal insulation	1	Bakelite
6.2.2	Lower spacer	1	Bakelite
6.3.0	Oil tightness parts		
6.3.1	Terminal locking nut	1	Brass
6.3.2	Split washer	1	Stainless steel
6.3.3	Gasket compression washer	1	Brass
6.3.4	Gasket	4	Nitrile rubber